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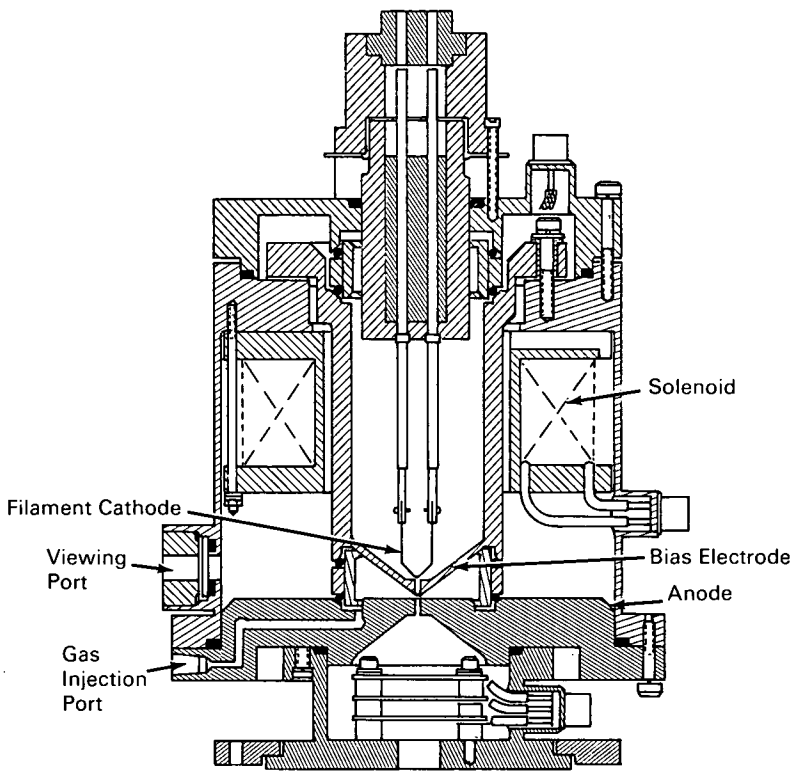
NASA TECH BRIEF

A Continuously Operating Source of Vacuum Ultraviolet Below 500 Å



The problem:

To develop a continuously operating source of ultraviolet radiation in the wavelength region between 10 and 1,000 Å. Present devices are so large (with energetic arc columns to 6 foot length) as to be inconvenient as laboratory tools.

The solution:

A duo plasmatron type source that is a modification of the Von Ardenne duo plasmatron. The source produces spectral lines below 500 Å in a helium environment, measured by a 1/2-meter, grazing incidence spectrometer.

How it's done:

The magnetic components, anode, bias electrode, and that portion of the outer chamber between these two electrodes are of soft iron. A solenoid of 1,000 turns of #18 copper wire produces the necessary magnetic field. The nose cone of the bias electrode saturates first in the magnetic circuit. This saturation

(continued overleaf)

occurs at about 12,000 gauss, being induced by a solenoid current of 2 amperes. This produces a magnetic field of about 7,000 gauss between the bias and anode electrodes. The bias electrode placed between the cathode and anode has a small aperture at its apex to restrict the arc.

The duo plasmatron design creates a magnetic mirror field in the region of high ion density and acts to reflect the electrons so that escape is possible only very near the axis. The arc is thus caused to draw down to a very small conical envelope coming to a point at the anode where ion densities of 6×10^{14} ions/cm^3 occur.

Helium is used for spectral line investigation and is introduced to the area of the ionizing arc through an injection port in the source body. The point source is located 5 cm from the entrance slit of the grazing incidence spectrometer.

Notes:

1. Because the spectra produced are determined almost completely by the gas injected, and because the source operates continuously, this arrangement should be beneficial in the development and calibration of filters and detectors within discrete wavelength ranges.
2. The duo plasmatron source has produced high ion densities from relatively low power input and the entire source assembly occupies a volume of only 100 cubic inches.
3. Inquiries concerning this innovation may be directed to:

   Technology Utilization Officer
   Goddard Space Flight Center
   Greenbelt, Maryland 20771
   Reference: B66-10576

Patent status:

No patent action is contemplated by NASA.

Source: Space Sciences Incorporated
under contract to
Goddard Space Flight Center
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